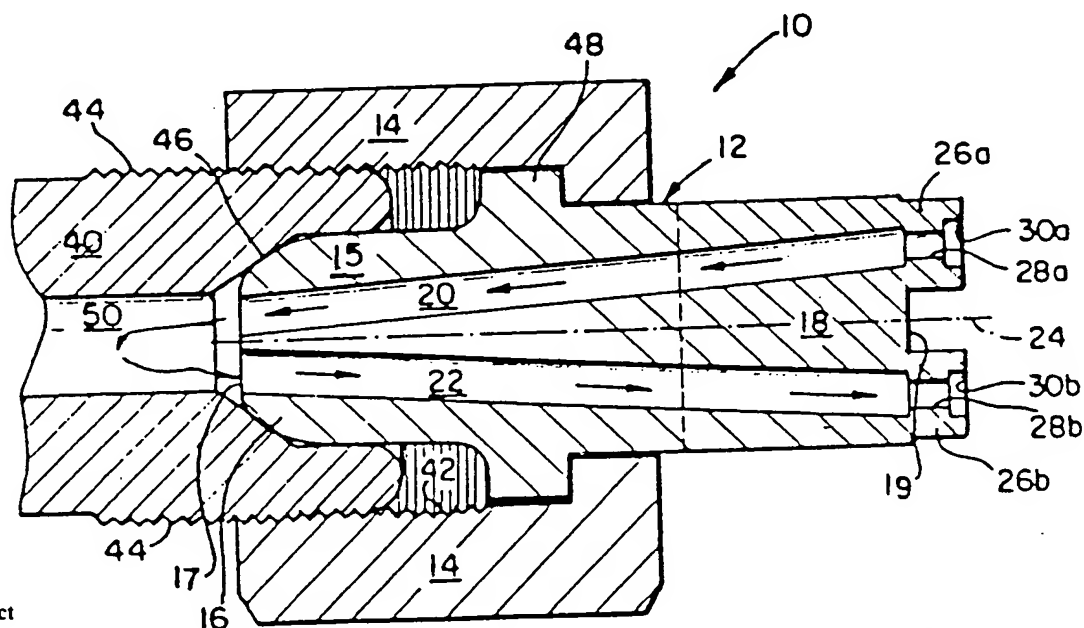


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(54) Title: A DEEP PURGE CONNECTOR FOR GAS SUPPLY SYSTEM



(57) Abstract

A gas connector (10) including a nipple element (12) has two boreholes (20, 22) formed in the nipple (12) extending lengthwise therethrough. The boreholes (20, 22) diverge as they extend from the sealing end (15) of the nipple (12) to the connecting end (18). Butt weld protrusions may be formed in the connecting end in communication with each of the boreholes. The protrusions (26a, 26b) are provided for welding gas tubing (32) to the nipple (12) at the terminal ends of the respective boreholes (20, 22). One of the boreholes is used for transmitting a process gas. The other borehole is used for introducing a purge gas into the gas supply system (100) in which the connector (10) is used. The nipple element (12) may also have its connecting end (18) adapted for connection to other gas conveying assemblies, such as cross-purge assemblies.

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present invention, will be better understood when read in conjunction with the appended drawings, in which:

Fig. 1 is a cross-sectional view of a deep purge connector embodying the invention prior to the welding of tubing thereto;

Fig. 2 shows the connecting end of the deep purge connector of Fig. 1;

Fig. 3 is a fragmentary cross-sectional view showing a piece of tubing butt-welded to the deep purge connector of Fig. 1;

Fig. 4 is a cross-sectional view of an alternate deep purge connector embodying the invention; and

Fig. 5 is a diagram of a gas supply system utilizing the deep purge connector according to the invention.

Description of the Preferred Embodiment

Referring now to Fig. 1, there is shown generally a deep purge connector 10. The connector 10 includes a nipple 12 and a nut 14. The nipple 12 has a generally cylindrical sealing end portion 15 having a rounded or semi-spherical end 16, also referred to as a bull nose, and a connecting end portion 18.

A pair of boreholes 20 and 22 are formed within the nipple 12 and extend generally lengthwise from the sealing end face 17 at the rounded end 16 through the connecting end face 19 of connecting end portion 18. The boreholes 20 and 22 diverge from the rounded end 16 at a preselected angle relative to the longitudinal axis 24 of nipple 12. In this manner, the terminals of boreholes 20 and 22 at the end face 19 are spaced farther apart than the terminals at sealing end face 17. It should be noted that the terminals of the two bores in the end face 17 are closely spaced proximate the center of the end face 17.

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The nut 14 is rotatably engaged with nipple 12, as shown in Fig. 1. Nut 14 is used for fastening the nipple 12 to a gas cylinder valve 40. Nut 14 has internal threads 42 for engaging with like threads 44 on valve 40. By screwing nut 14 onto valve 40, rounded end 16 of nipple 12 is engaged with tapered opening 46 in cylinder valve 40. As the nut 14 is tightened, it presses on shoulder portion 48 of nipple 12, thereby forcing rounded end 16 against the tapered opening 46 and forming a metal-to-metal seal. In this manner, the inner terminals of boreholes 20 and 22 are brought into communication with the cylinder valve orifice 50. In order to avoid twisting nipple 12 during the attachment and disconnection of deep purge connector 10 to the cylinder valve 40, nipple 12 may be provided with flats 52a and 52b in connecting end portion 18 for applying a wrench or other tool.

Referring now to Fig. 4, there is shown an alternate embodiment of the deep purge connector according to the invention. This embodiment is particularly designed for use with valves whose orifice does not accept the rounded nose 16 of the previously described embodiment. A nipple 412 has a flat sealing end 416. A soft (generally plastic) washer 417 is used to assure leak-proof contact between nipple 412 and the cylinder valve 440. A pair of boreholes 420 and 422 divergingly extend from the sealing end 416 to a connecting end 418. It is to be noted that these holes converge at the sealing end 416 within the central opening 419 of washer 417. Protrusions 426a and 426b are formed on connecting end 418 for communication with boreholes 420 and 422, respectively. The boreholes 420 and 422 diverge at a preselected angle from longitudinal axis 424 of nipple 412. A nut 414 is also

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should be noted that the terminals of boreholes 20 and 22 are spaced apart in the end face 17 but are sufficiently close together to open directly into the orifice 50. In other words, a circle circumscribing the terminals in the end face 17 is smaller than the contact diameter between the rounded end 16 of nipple 12 and the tapered opening 46 of cylinder valve 40 so that the purging gas introduced through the borehole 20 must enter the orifice 50 of the cylinder valve 40 before it can exit through the borehole 22, thereby forcing the gas out and enhancing the purging process. Borehole 22 is in communication with supply line 114. Thus, the purging gas is directed down the supply line 114 through valve 122, and is exhausted to a suitable purifier or collector through vent line 126. In this manner, the entire gas supply system from valve 112 through gas supply line 114 may be purged, without leaving any unpurged areas in the vicinity of cylinder valve 112.

From the foregoing description and the accompanying drawings, it can be seen that the present invention provides a novel apparatus for deep purging a gas supply system. The apparatus is simple to manufacture and is fabricated in a way which minimizes the generation of particles which could be introduced into the process gas stream. Additionally, there are only two joints required to connect the pigtails to the nipple and no additional parts are required to make up the assembly.

It will be recognized by those skilled in the art that changes or modifications may be made to the above-described embodiment without departing from the broad, inventive concepts of the invention. For

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boreholes extending lengthwise through said nipple, the improvement wherein:

the boreholes terminate at the connecting end, and at the sealing end, and diverge as they extend from the sealing end to the connecting end; and the connecting end includes means for permitting butt welding tubing to the nipple at each of the locations where the boreholes terminate in the connecting end wall to enable each borehole to communicate with a tubing end.

8. A deep purge connector as recited in Claim 7 wherein said butt welding means comprises:

a pair of cylindrical protrusions having a cylindrical axis parallel to said longitudinal axis of the nipple, each protrusion having a central bore therethrough communicating with one of said boreholes in said nipple element, said protrusions each also having a counterbore coaxial with the central bore, said counterbore having a depth and diameter sufficient for receiving a tubing end, the central bore having a diameter corresponding to the inner diameter of the tubing and the counterbore having a diameter corresponding to the outside diameter of said tubing.

9. A deep purge connector as recited in Claim 8 including a tubing element mounted in each of said counterbores, the ends of said tubing elements being welded to said protrusion so as to integrally unite said tubing elements with the nipple.

10. A deep purge connector comprising:

a nipple element having an elongated, generally cylindrical shape, said nipple element

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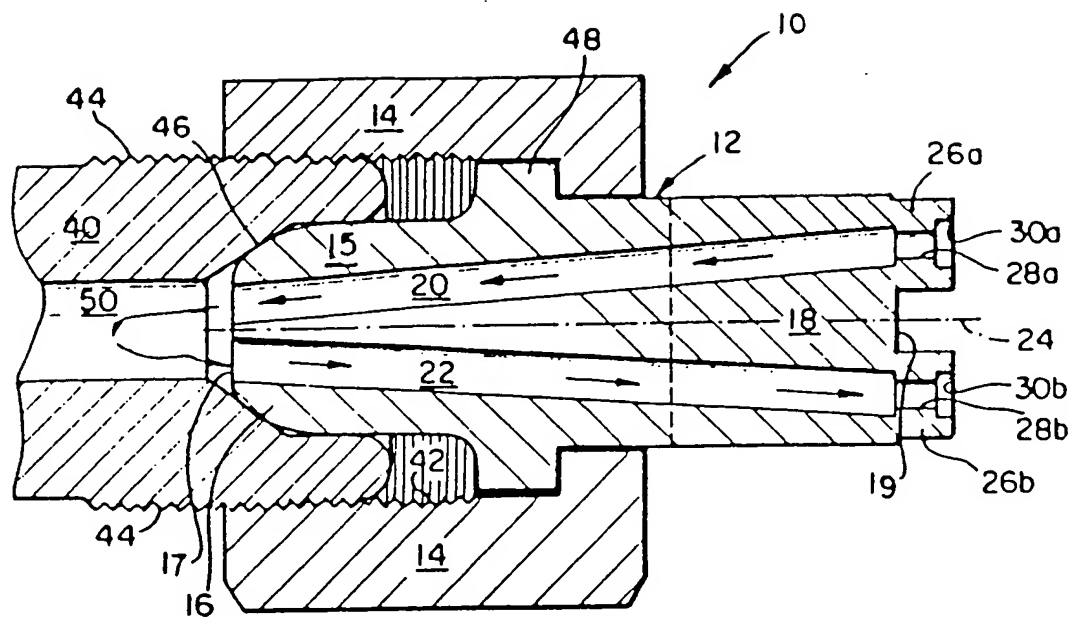


FIG. 1

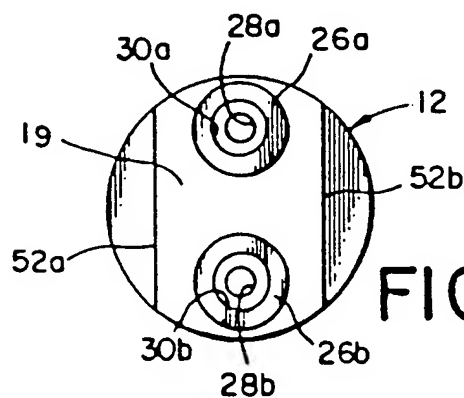


FIG. 2

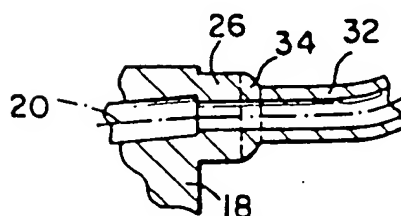
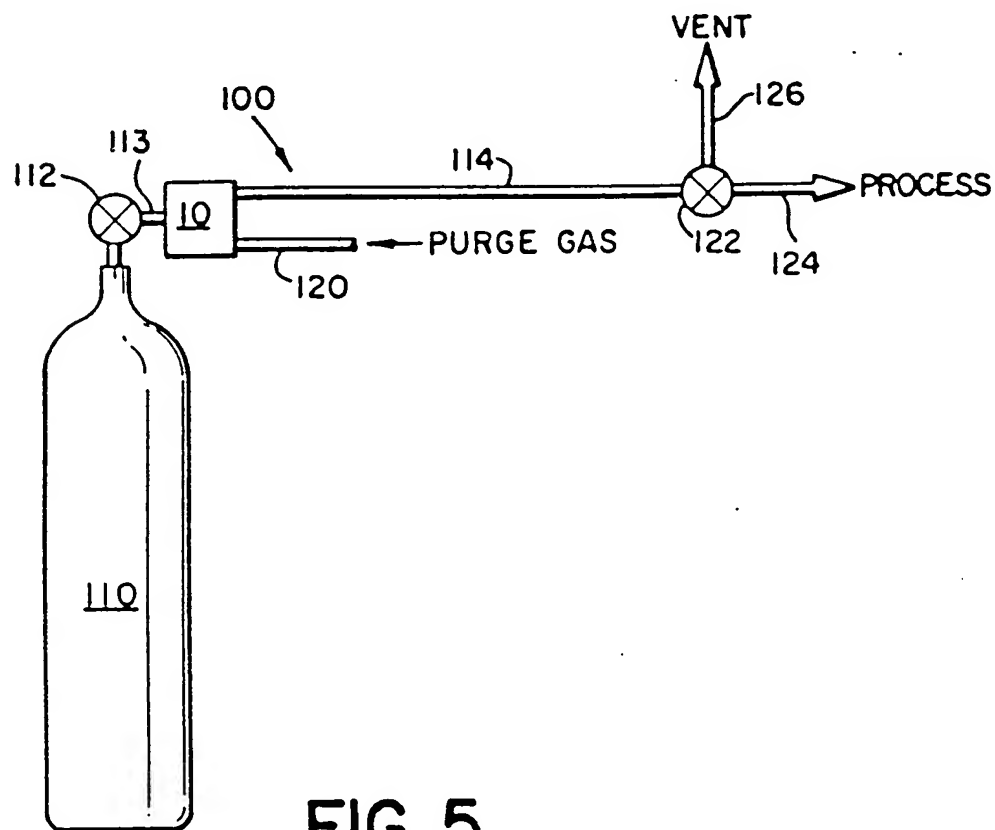
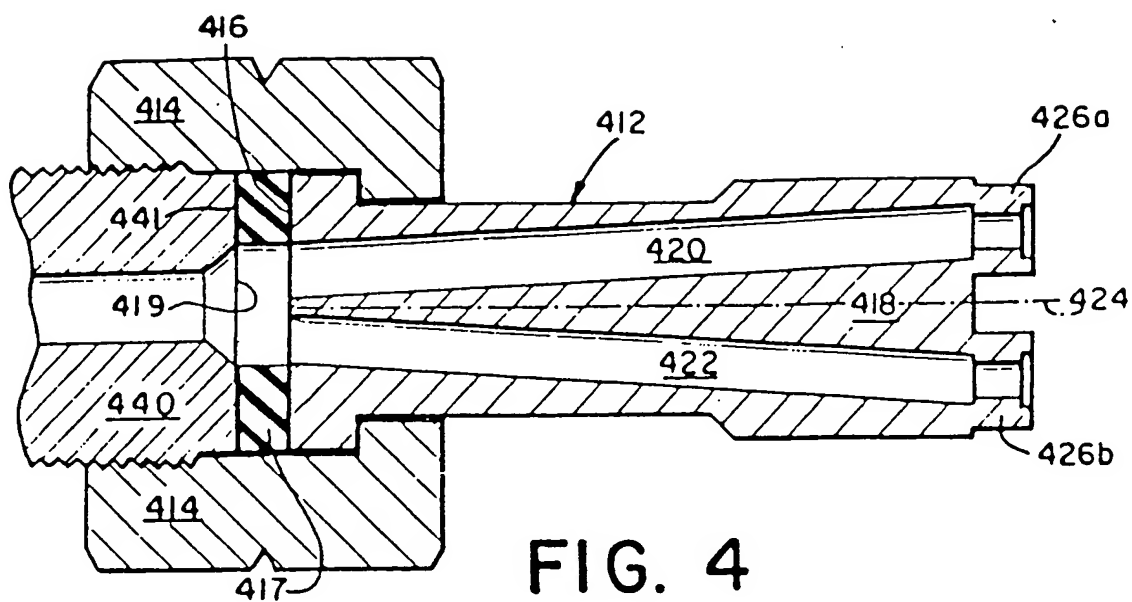


FIG. 3

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 86/01105

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ¹		
According to International Patent Classification (IPC) or to both National Classification and IPC		
INT. CL. ⁴	B08B 5/02, 9/06	
US. CL.	137/602,240;285/137R,286	
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
U.S.	137/238,240,602 285/155,137R,285,286	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁴		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁹	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
A	US, A, 2,570,525 (Collison) 9 October 1951	
A	US, A, 4,133,347 (Mercer) 9 January 1979	
A	US, A, 4,316,624 (Davlin) 23 February 1982	
Y	US, A, 4,383,547 (Lorenz et al) 17 May 1983 See Col. 3, lines 53-69, Col. 4, line 64 to Col. 5, line 2	1-3, 6-10
A	US, A, 4,169,486 (Otteman et al) 2 October 1979	
X Y	US, A, 3,898,861 (McMillan) 12 August 1975 See Fig. 6	4-5 1-3, 6-10
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IV. CERTIFICATION		
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